NOAA Outreach and Education on Protected Species (NOEPS)

Scientists teaching science!

Visit us on the web:

http://tinyurl.com/psbNOEPS

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Free 1 hour classroom lessons on 1 of the 5 following lesson strands.

Bioacoustics

- Kindergarten-2nd Grade
  - Blind find
  - Whose sound is it anyway?
    - After reviewing some marine mammals and their sounds, students try to identify animals by first their sound, then additional information, then picture
- 3rd-5th Grade
  - Whose sound is it anyway?
  - Sound dichotomous key
  - Whale Morse Code
    - Students use buzzers to make their "calls" (Morse code sequence) to find their pod

Marine Mammals in Our Backyard

- Kindergarten-2nd Grade
  - Is it a mammal?
    - Students identify mammals
  - Is it a marine mammal?
    - Students circle marine mammals on their sheets
  - Is it a right whale?
    - Students match actual right whale pictures with drawings to ID the animals
- 3rd-5th Grade
  - Is it a right whale?
  - Is it the right whale?
    - Students are given picture cards and must identify the species they have using a dichotomous key.

Marine Mammal Adaptations And Climate Change

- Kindergarten-2nd Grade
  - Structure and function
    - Students use pictures of actual marine mammals and circle the adaptations they see
  - Make your own animal
  - Climate Change Videos
- 3rd-5th Grade
  - Structure and function
    - Students use pictures of actual marine mammal, list the adaptations they observe and hypothesize their function
  - Dem Bones
    - Students construct and compare dolphin and human skeleton
  - Climate Change Videos

Threats Facing Marine Mammals

- For All Grades
  - Rubber band entanglement
  - Marine debris net activity
  - Would you swim in this?
    - Students create their own mini-ocean to simulate what is found in the ocean these days

Food Web/ Ecology

- For All Grades
  - What do you eat?
    - Students must match their tooth/baleen to the proper animal and prey
  - Build a food web/overfishing activity
  - Food web/ ecosystem collage

Lesson Link to Massachusetts State Science Curriculum Standards

*All of the lessons reinforce the scientific method by asking students to observe, predict, hypothesize, participate in an experiment or activity, sort/classify, and make conclusions.

Kindergarten through 2nd grade

(1) Bioacoustics
   a. LS6 – Recognize that marine mammals interact with their environment through their five senses with a focus on sound.

(2) Marine Mammal Adaptations and Climate Change
   a. LS1 – Recognize that mammals and marine mammals are living things that grow, reproduce, and need food, air, and water.
   b. LS6 – Recognize that marine mammals interact with the marine environment through their 5 senses.
   c. LS7 – Recognize that climate change has changed the seasonal shifts that affect marine mammals and has impacted their seasonal behaviors.
   d. LS8 – Identify the ways in which the marine mammal's marine habitat provides for its basic needs (food, water, air, shelter). Discuss how climate change affects that.

(3) Marine Mammals in Our Backyard
   a. LS1 – Recognize that marine mammals are living things that grow, reproduce, and need food, air, and water.
   b. LS2 – Compare mammals and then marine mammals and discuss how animals in these groups are more similar to each other than animals in other groups.
   c. LS4 – Discuss how the North Atlantic Right Whales closely resemble each other but differ.
   d. LS7 – Recognize that many marine mammal species migrate seasonally.
   e. PS1 – Sort North Atlantic Right Whales by observable properties.

(4) Threats Facing Marine Mammals
   a. LS6 – Recognize that people and marine mammals interact with the marine environment through their various senses
   b. LS8 – Identify the ways in which a marine mammal's habitat provides for its basic needs and identify how humans impact that.

(5) Food Webs
   a. LS1 – Marine mammals are living things that grow, reproduce, and need food.
   b. LS2 – Differentiate between living and nonliving things.

Third through 5rd grade

(1) Bioacoustics
   a. LS1 – Classify marine mammals according to their physical characteristics (vocalizations or sounds) that they share
   b. LS5 – Differentiate between observed vocalizations of marine mammals that are fully inherited and regional/pod specific "dialects" that are affected by location.
   c. LS8 – Describe how marine mammals meet some of their needs (mating, feeding, locating pod members) in the marine environment by using their vocalizations in response to information received from the environment
   d. LS10 – Give examples of how humans are causing changes in the marine environment (modifying shipping lanes, decreasing human made noise) to ensure the survival of marine mammals.
   e. PS1 – Sort marine mammals by observable properties (vocalizations or sounds)

(2) Marine Mammal Adaptations and Climate Change
   a. LS1 – Classify marine mammals according to their physical characteristics
   b. LS 6 – Compare and contrast the physical characteristics of a dolphin and human skeleton and discuss how this enables them to be adapted to their very different habitats.
   c. LS7 – Give examples of how climate change has caused some marine mammals to change their behavior or location.
   d. LS8 – Describe how marine mammals meet some of their needs in the environment by using behaviors in response to information received from the environment. Discuss the difference between behavior and adaptation.
   e. LS10 – Give examples of how humans can affect the environment and ensure the continued survival of some marine mammal species.

(3) Marine Mammals in Our Backyard
   a. LS1 – Sort and classify marine mammals based on their physical characteristics.
   b. LS5 – Observed characteristics of marine mammals can be fully inherited or affected by the marine environment.
   c. LS7 – Changes in the environment have caused some marine mammals to move to new locations.
   d. LS10 – Give examples of how humans can change the environment to ensure the survival of marine mammals.

(4) Threats Facing Marine Mammals
   a. LS5 – Differentiate between observed characteristics of marine mammals and characteristics of marine mammals that have be affected by their environment/human impacts.
   b. LS7 – Give examples of how changes in the marine environment (both human and other) have caused some marine mammals to die or migrate.
   c. LS8 – Describe how some marine mammals have some inherited behaviors and some learned.
   d. LS10 – Give examples of how humans can change the environment to ensure the survival of marine mammals.

(5) Food Webs
   a. LS1 – Sort animals in our food web based on their physical characteristics
   b. LS7 – Give examples of how changes in the marine environment or food availability have caused some marine mammals to die or migrate.
   c. LS8 – Describe how marine mammals meet their dietary needs by using certain behaviors to locate their food
   d. LS10 – Discuss how humans can change the environment to ensure the survival of marine mammals
   e. LS11 – Discuss the food web.

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Resources:

- **Bioacoustics**

  PSB Acoustics Sounds: www.nefsc.noaa.gov/psb/acoustics/sounds.html
  Voices in the Sea: http://cetus.ucsd.edu/voicesinthesea_org
  Bridge: http://web.vims.edu/bridge

- **Marine Mammal Adaptations and Climate Change**

  Monterey Bay Aquarium: http://www.montereybayaquarium.org/climate
  Chesapeake Bay Ecosystem: http://ecopath.org/LifeInTheChesapeakeBay
  United Nations Environment Programme: http://www.rona.unep.org/toomey
  Climate Change Education: http://climatechangeeducation.org
  Environmental Protection Agency: http://epa.gov
  Port Townsend Marine Science Center, Orca Bone Atlas: http://www.ptmsc.org/boneatlas

- **Marine Mammals in Our Backyard**

  Google Earth: http://www.google.com/earth
  New England Aquarium: http://www.neaq.org
  Right Whale Listening Network: http://www.listenforwhales.org
  Alaska Fisheries Science Center: http://www.afsc.noaa.gov
  Whale Times: http://whaletimes.org
  PSB Acoustics Species and Sounds: http://www.nefsc.noaa.gov/psb/acoustics/sounds.html

- **Threats Facing Marine Mammals**

  Voices in the Sea: http://cetus.ucsd.edu/voicesinthesea_org
  Kid Cyber: http://kidcyber.com.au/
  Marine Debris Coloring Book: yoto98.noaa.gov
  Marine Debris in the Chesapeake Bay: blog.baybackpack.com

- **Food Web/ Ecology**

  Whale times: http://whaletimes.org/
  Bridge: http://web.vims.edu/bridge
  Food chain game:
http://www.sheppardsoftware.com/content/animals/kidscorner/games/foodchaingame.htm